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an electrolyte film comprised of a first solid electrolyte exhibiting oxide ion conductivity;

a fuel electrode substrate which is bonded to a surface of the electrolyte film, and

an air electrode which is bonded to the other surface of the electrolyte film forming in total an electrolyte-electrode assembly,

wherein the fuel electrode substrate is characterized by comprising a cermet of a first catalyst and a second solid electrolyte which shows oxide ion conductivity and has a bending strength of 500 MPa or more.

REMARKS

This preliminary amendment corrects various minor informalities in the specification and claims, which arose during the translation of the application into English.

If there is any fee due in connection with the filing of this Preliminary Amendment, please charge the fee to our Deposit Account No. 06-0916.

Respectfully submitted,

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Dated: March 10, 2003

By: _____
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PATENT
Customer No. 22,852
Attorney Docket No. 04917.0095

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	
Kenji UKAI et al.	Group Art Unit: 1745
Application No.: 09/983,056	Examiner: Not Assigned
Filed: October 23, 2001	
For: SOLID OXIDE FUEL CELL HAVING A SUPPORTED ELECTROLYTE FILM	

Commissioner for Patents
Washington, DC 20231

Sir:

APPENDIX TO PRELIMINARY AMENDMENT

IN THE SPECIFICATION:

Page 3, replace the last paragraph bridging page 4 with the following new paragraph:

In [a] the fuel electrode substrate 34 for the SOFC 30 having a supported electrolyte film [30], a cermet comprising nickel and yttria-stabilized zirconia (referred to as 8YSZ hereinafter), which has a composition of ZrO_2 containing 8 mol % Y_2O_3, is employed. 8YSZ is also commonly used for the electrolyte film 32. (For example, refer to "SOLID OXIDE FUEL CELL VI", S. C. Singhal, M. Dokiya (ed.), p822-p829.)

Page 5, replace the last paragraph bridging page 6 with the following new paragraph:

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To achieve the objects and in accordance with the purpose of the present invention, as embodied and broadly described herein, a solid oxide fuel cell having a supported electrolyte film comprises an electrolyte film comprised of a first solid electrolyte exhibiting oxide ion conductivity, a [supporting substrate for a fuel electrode] fuel electrode substrate which is bonded to a surface of the electrolyte film, and an air electrode which is bonded to the other surface of the electrolyte film forming in total an electrolyte-electrode assembly, wherein the fuel electrode substrate is characterized by comprising a cermet of a first catalyst and a second solid electrolyte which shows oxide ion conductivity and has a bending strength of 500 MPa or more.

Page 8, replace the first paragraph under Detailed Description of the Preferred Embodiment, with the following new paragraph:

A detailed description of one preferred embodiment of an SOFC having a supported electrolyte film embodying the present invention will now be given referring to the accompanying drawings. In Fig. 1 is shown a section view of an SOFC having a supported electrolyte film relating to the preferred embodiments of the present invention. In the figure, an SOFC 50 having a supported electrolyte film has a structure in which an electrolyte-electrode assembly 60 is interposed between two gas separators 62, 62. The electrolyte-electrode assembly 60 is equipped with an electrolyte film 52, a fuel electrode substrate 54, an air electrode 56, and an interlayer 58.

Page 9, replace the last paragraph bridging page 10, with the following new paragraph:

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For the first solid electrolyte, ScSZ with scandia only dissolved in solid phase may be used, or of trace amounts of yttria (Y_2O_3) or ceria (CeO_2) may be further added. In the case of further addition of yttria to ScSZ, the content is preferably below 2 mol %. An yttria content exceeding 2 mol % lowers the oxide ion conductivity of the electrolyte film [(52)] 52, and is not preferred. The yttria content in ScSZ is, more preferably, 0.5 to 1 mol %.

Page 10, replace paragraphs 2 and 3 with the following new paragraphs:

In the addition of ceria further to ScSZ, the content is preferably below 2 mol %. A ceria content exceeding 2 mol % lowers the oxide ion conductivity of the electrolyte film 52, and is not preferred. The ceria content in ScSZ is, more preferably, 0.5 to 1 mol %.

It is preferable that the first solid electrolyte is a composite material of ScSZ with alumina (Al_2O_3). In the composite material of ScSZ with alumina, the alumina content is preferably below 2 wt % of ScSZ. An alumina content exceeding 2 wt % lowers the oxide ion conductivity of the electrolyte film 52, and is not preferred. The alumina content in ScSZ is, more preferably, 0.5 to 1 wt. %.

Page 11, replace the second and third paragraphs with the following new paragraphs:

The thickness of the electrolyte film 52 is determined depending on the material property of the electrolyte film 52 and the combination of [a] the fuel electrode substrate 54, [an] the air electrode 56, and [an] the interlayer 58, which are to be described later,

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so that the prescribed oxide ion conductivity and the sufficient gastight property are retained at operating temperatures of the SOFC 50 having a supported electrolyte film. The thickness of the electrolyte film 52 is usually in a range of 10 to 20 μm.

Then an explanation is given on the fuel electrode substrate 54. The fuel [cell] electrode substrate 54 is to support the electrolyte film 52. In the SOFC 50 having a supported electrolyte film relating to the preferred embodiments of the present invention, a cermet comprising the first catalyst and a second solid electrolyte which shows oxide ion conductivity is employed for the purpose.

Page 15, replace the last paragraph bridging page 16, with the following new paragraph:

An explanation is given then on [a] the gas separator 62. The gas separator 62 is a device for supplying fuel gas to the fuel electrode substrate 54, and oxidant gas to the air electrode 56 respectively. For the purpose, each gas separator 62 is equipped with a gas flow path 62a for supplying reacting gas [respectively]. Also the gas separator 62 works as collecting equipment of electric current generated at [an] the electrolyte-electrode assembly 60. Therefore, materials that satisfy conditions such as stability at operating temperatures, high electric conductivity, and gastight property (for example, Lanthanum-cromite-based oxides) are employed for the gas separator 62.

Page 20, replace the second paragraph with the following new paragraph:

[On the contrary, construction of a four-layered structure comprising the fuel electrode substrate 54, electrolyte film 52, interlayer 58 containing a highly oxide ion-

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conductive third solid electrolyte between them, and the electrolyte-electrode assembly 60 may facilitate reduction in the interfacial resistance between the electrolyte film 52 and the fuel electrode substrate 54.] To the contrary, as for the SOFC 50 having a supported electrolyte film consistent with the preferred embodiments of the present invention, the interlayer 58 containing the highly oxide ion-conductive third solid electrolyte is sandwiched between the fuel electrode substrate 54 and the electrolyte film 52, so that the electrolyte-electrode assembly 60 has a four-layered structure, whereby enabling the interfacial resistance between the electrolyte film 52 and the fuel electrode substrate 54 to be lowered. For this reason, increase in the overvoltage derived from interfacial resistance is suppressed and the performance of the SOFC 50 having a supported electrolyte film is further improved.

Page 21, replace the second paragraph with the following new paragraph:

By the way, for the painting method of the interlayer 58, the electrolyte film 52, and the air electrode 56, various techniques may be used including screen printing, painting with brush, spraying, or dipping, and the method is not limited in any manner at all. In the above-explained example, a sintering method is individually adopted for the fuel electrode substrate 54, the interlayer 58, the electrolyte film 52, and the air electrode 56. In the case the most suitable temperatures are close for respective layer, simultaneous sintering of two adjacent layers or more is allowable.

IN THE CLAIMS:

1. (Amended) A solid oxide fuel cell having a supported electrolyte film comprising:

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an electrolyte film comprised of a first solid electrolyte exhibiting oxide ion conductivity;

a [substrate for a fuel electrode] fuel electrode substrate which is bonded to a surface of the electrolyte film, and

an air electrode which is bonded to the other surface of the electrolyte film forming in total an electrolyte-electrode assembly,

wherein the fuel electrode substrate is characterized by comprising a cermet of a first catalyst and a second solid electrolyte which shows oxide ion conductivity and has a bending strength of 500 MPa or more.

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